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Union of South Africa, has been appointed a reader in estate management at Cambridge

DISCUSSION AND CORRESPONDENCE

THE PRESERVATION OF WILD LIFE

THE Ecological Society of America's committee on the preservation of natural conditions, while unable to deal with problems concerning wild life not in reserves, continually encounters the fact that individual species are menaced with extinction by agricultural encroachments. Two of these menaces are:

1. Clean-culture (roadside mowing and burning) as distinguished from roadside and streamside shrubbery and bird and original life preservation.

Birds are decreasing for lack of nesting sites, on account of destruction of breeding conditions. Entomologists and some agriculturists maintain that this condition is necessary to agriculture. Bird men insist that birds are also essential. It is known that a few states encourage roadside shrubbery while several require roadside mowing. The practise in the various parts of the United States and Canada should be ascertained. The effect of different procedures should be determined. The areas in which specially destructive and drastic measures such as burning for insect pests are necessary should be clearly defined and limited and the public informed as to the dangers of such burning.

2. Upland marshes are important as sponges storing water and letting it out slowly during dry seasons, thus controlling floods. Such marshes are gradually being drained and the flood menace is increasing every year.

The only way to save these natural resources and at the same time, the swamp faunas, especially the birds, is to utilize the swamps for aquaculture. To this end several water-culture experiment stations should be established. For the present there should be one, perhaps at Cornell University, to deal with the upland marsh problems. There should be another in connection with Okefinokee swamp and one in connection with the coastal swamps of New Jersey. In addition to frogs,

fish, and birds, a number of plants are good for food, etc.; *e. g.*, cattail flour and cattail paper have recently been tried with success. Swamp potatoes, the corns of arrowhead, and seeds, roots, and stalks of our native lotus served as food for the American aborigines and pioneers. Hedrick (*SCIENCE*, 40:611), Claussen (*Sci. Mo.*, 9:179), and Needham and Lloyd ("Life of Inland Waters") have discussed these questions and suggested or advocated the improvement and culture of aquatic plants.

It is the belief of the committee that all organizations in any way interested should combine efforts for the investigation of these questions.

For a list of the committee members, see *SCIENCE*, March 26, 1920; since that date the following have been added: Z. P. Metcalf, University of North Carolina; C. A. Shull, University of Kentucky; R. M. Harper, College Point, N. Y.; and Jens Jensen, Ravinia, Illinois.

V. E. SHELFORD,
Chairman

UNIVERSITY OF ILLINOIS

PREDILECTION AND SAMPLING OF HUMAN HEIGHTS

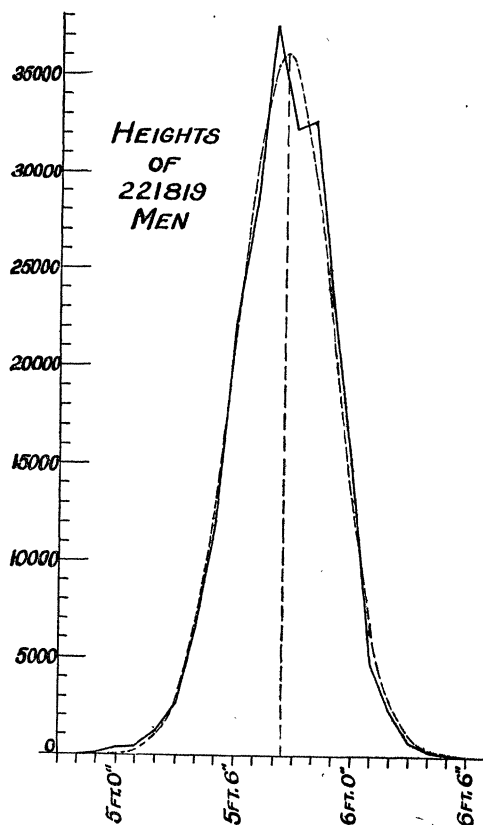
TO THE EDITOR OF *SCIENCE*: Extensive reliable data showing the distribution of human heights in "unselected" populations are surprisingly hard to obtain. The Association of Life Insurance Medical Directors and the Actuarial Society of America have, however, undertaken a very careful statistical study of men accepted for life insurance,¹ which provides, among other things, a distribution of the heights of 221,819 men. Here, at last, we might expect to settle the question of the form of distribution that would hold for a population, but we discover in the distribution curve a remarkable inversion that it is difficult to explain as anything other than an artefact.

This distribution curve is the solid line of the figure. The average height is 5 ft. 8.49 in. Since the curve is plotted in units of an inch,

¹ "Medico-Actuarial Mortality Investigation," Vol. I., 1912, esp. 11-22.

the peak is at 5 ft. 8 in. The inversion occurs just above the peak: there are fewer men recorded at 5 ft. 9 in. than at 5 ft. 10 in. That the inversion is not due to the inclusion of men of different ages in the same curve is shown by the fact that it occurs for ten of thirteen age-groups (five-year range) taken separately.

The question arises as to the cause of this striking feature of the curve.



We are at liberty to conclude that the observed curve is the "true" distribution of American male heights, but most persons, whether they believe in the *a priori* necessity of the Gaussian form of distribution or not, will be under a strong conviction that the curve should at least be smooth and not bimodal.

The alternative explanation is that the inversion is an artefact. The sampling of the records in the offices of the insurance companies was carefully done. All risks accepted

during January of the odd years and July of the even years throughout a sixteen-year period were included. It would seem probable, therefore, that the selection must have occurred when the measurements were made. Many persons who were nearest 5 ft. 9 in. must have been recorded as 5 ft. 8 in. or 5 ft. 10 in. Here we would have a case of artificial selection that depends on the factors involved in obtaining measurements, a case analogous to the predilection that occurs when estimates are made in "round numbers" or, as happened in this investigation, to the predilection to give weights as multiples of five pounds.² We may hazard that the error occurred not so much in reading the measuring stick as in the acceptance by the examining physician of the person's own statement of his height. There may be a tendency for a person to prefer an even 8 or 10 in. height to an odd 9. There is, however, no similar inversion obvious at 4 ft. 8-10 in., although this may be obscured by the effort of men of this height to have themselves recorded as 5 ft.; there is a suspicious bump in the curve just above 5 ft. And the cases at 6 ft. 8-10 in. are too few to show.

The further question arises whether the predilection is simply against the 9 in. or whether all even heights are favored. It is not possible to determine this accurately, since an inversion can not so readily appear in the steeper parts of the curve. If we take the Gaussian distribution (dotted line in the figure) as ideal we see that it is not true that even inches fall above this ideal and odd below. But then it is doubtful whether the Gaussian distribution should be ideal. You can not, at least, prove it from these data, since the probability that an ideal Gaussian distribution would turn out as this observed distribution has is only (by Pearson's χ^2 -criterion) about one chance in 10^{18} .

We appear to have, then, a special predilec-

²For a complete discussion of the influence of these communal mental habits upon scientific measurements and other quantitative judgments, see J. E. Coover, "Experiments in Psychological Research," 1917, 229-290.

tion in favor of a height of 5 ft. 8 in. or 5 ft. 10 in., or both, which is a function simply of human preference for these heights. The writer would appreciate any information from the readers of SCIENCE which indicates other ways in which this inversion might have been brought about, or which goes to show that persons would tend to regard these two heights as especially desirable.

The instance shows how difficult it is to obtain an "unselected sample" by merely securing large numbers of cases without scientific control of the original observations.

EDWIN G. BORING

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THE PLIGHT OF SCIENTIFIC PERIODICALS¹

THE world of to-day is in new and trying situations. It is trying its best to meet the conditions imposed upon it by the experiences of the last six years, without relinquishing all of its former ideals.

Its situation is somewhat like that of a family whose house burned last night, but whose clothing and furniture were saved through the energy of the neighbors. Morning has come and reveals the state of confusion. Mother's slippers are in the coffee pot and the lamp shade is full of potatoes. Everything is there, but it will require a long time to bring order out of confusion, at the same time the family must live and maintain domestic peace.

In this country the average man is of the opinion that science had much to do in deciding the military and economic issues from 1914 to 1918. It is not, however, altogether unlike human nature that it should forget its benefactor, though still grateful for the benefactions. Nevertheless, science in this country is to-day in a precarious condition because of the embarrassed financial condition of its professional magazines. It has always been difficult to get scientific work published in this country. The publishers were always politely regretting their inability to publish scientific material, because they had found by experience that it did not pay.

The public seemed to have so many other ways in which to spend its money that it didn't want to buy dry books or periodicals.

Science is advanced by research work. That which is discovered is published in technical periodicals or books in the hope that it may advance knowledge and contribute to human welfare. Research work is mainly done by men and women connected with educational or public service institutions. The discoveries which they make are for the benefit of the public rather than the discoverer. Few of their discoveries can be capitalized for personal advantage, and few of the workers have any inclination in that direction. They furnish their original researches to scientific periodicals without receiving reimbursement for them. The main thing the investigator seeks is the opportunity to present his results in an adequate and dignified way to those who may enjoy or use them, and with reasonable promptness.

Consider the situation of the worker in science at the present time. He sends his manuscript to the editor of the *Journal of* _____. In due time he receives some such letter as this:

We should be glad to publish your manuscript in the *Journal of* _____, but our funds are so restricted that we are obliged to cut down articles as much as possible. In view of the increased cost of printing we want to ask if you would be willing to omit the introduction and first three tables and to combine the other tables into one. We are trying to restrict all articles to ten pages or less of printed matter. The illustrations can not be published unless you will bear the entire cost of plates and paper yourself.

Regretting that such restrictions are necessary, we beg to remain, etc.

The author is obliged to accede to the editor's requests if his paper is to be published and writes accordingly. In about eight months he receives the proof sheets and about a year from the time the manuscript was written the journal containing it is issued. The magazine is thin and pale in appearance. In a few weeks the author gets a package of reprints for which he has to pay at the rate